

FAA National Software Conference

Software DERs in the SW Life Cycle Process

Year 2000 FAA Software
Standardization Conference

Software DER's Role in the Software Lifecycle Process

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Agenda

- Introduction
- DER Interviews
 - DER Roles
- Applying the Job Aid
- What Helps Facilitate the Approval Process - Lessons Learned
- Discussion

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Introduction - Approach



- Interviewed 10 DERs from several companies
 - What is your role as a DER in the software lifecycle process?
 - Do you use the Job Aid?
 - Do you attend reviews?
 - How can the final review process be improved?
 - What lessons have you learned?

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DER's Role is Multi-faceted



- Everyone interviewed regarded the DER's role as multi-faceted and listed some or all of the following roles:
 - Policeman
 - Teacher
 - Auditor
 - Quality Engineer
 - Systems Engineer
 - Safety Engineer
 - Coach

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Policeman Role



- Make sure there is enough evidence to show that the project accomplished everything they were supposed to have accomplished
- Make sure the project didn't miss anything for whatever reason
- Ensure that the processes defined for the program under DO-178B were followed and the objectives were met

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Teacher/Mentor Role



- To a certain extent the DER is also a Teacher - the job is to educate the project on regulatory guidance and explain how to successfully complete a project
- Explain how and why certain pieces of the puzzle are put into place
- Provide information on what Notices have come out - where to find them
- Just as DER's have mentors in the FAA, the DER acts as a mentor to the projects

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System Engineer Role



- Open people's eyes to see how their piece of software interacts in an airplane
 - Help to ensure that the projects enforce a sense of consistency across projects
- In many cases, the DER may not have extensive knowledge in the systems engineer's role, but should at least look for evidence that the project has considered the larger picture

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Safety Engineer Role



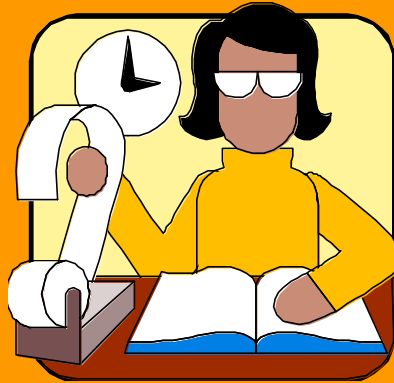
- The equipment and its' use will have safety implications
- Many projects do not have a dedicated safety engineer
- The DER should make sure that the systems people did not change any of the basic fundamentals
 - Example: If the project decided that this was a Level B box based on redundancy and this was part of the safety analysis, then if the box was installed differently, the criteria has changed
- Review the safety analysis to understand criticality levels and PSAC concurrence

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Quality Engineer Role



- If there is strong support from the QE function the DER doesn't have to analyze everything
 - For example, if QE is attending peer reviews, monitoring tests, assuring the tests documented are the tests executed and assuring control in the testing process, then DER can sample QE records and test results
- If there is little support from the QE function or if there is a situation where the QE function is inadequate, then the DER should perform the QE role

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Coach Role



- The DER is not technically doing the work but is part of the engineering team
- "I see the DER's Role as Coach and the game to win is Safety"

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Designer/Manager Role - Not



- Most agreed on what the DER's Role is Not
 - Designer
 - It usually does not work for the DER to take on the role of Design Engineer and impose this role on the project
 - Project Manager
 - It is important to be reasonable and cooperative and not try to define the project's processes

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Applying the Job Aid



- The majority of DERs interviewed do not use the Job Aid (yet)
 - Most of the projects they are working on are modifications, not new projects
 - Most thought they met the intent of the Job Aid
 - Nearly all plan to try the Job Aid on the next new project they work on

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Applying the Job Aid



- Job Aid has four insertions into the software lifecycle process:
 - Planning
 - Development Process
 - Requirements
 - Design
 - Implementation
 - Verification/Test
 - Final Review

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Planning Phase




- Major evaluation activities for Planning
 - Assure plans meet DO-178B objectives
 - Assure that the processes described in the plans meet the objectives of DO-178B
 - Address specifically how DO-178B objectives are achieved
 - Evaluate QE involvement
 - Examine defined standards for requirements, design, code
 - Get involved in the project early - submit the PSAC for FAA agreement early

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Development Phase - Requirements



- Most DERs interviewed do not participate with the project during the requirements phase
- Some DERs depend on the QE function to assure that the right team members attend planned reviews and that the requirements are:
 - documented
 - unambiguous
 - accurate
 - conform to standards
 - verifiable
 - traceable

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Development Phase - Design



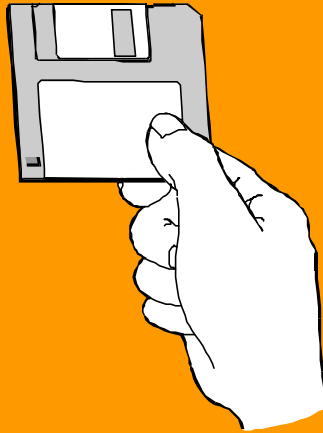
- Design Phase
 - Assess plan changes
 - Assess change control process
 - Assure the software requirements are translated into the design
 - Assure the low level requirements conform to the design standards
 - Ask if derived low level requirements are provided to the system safety assessment process

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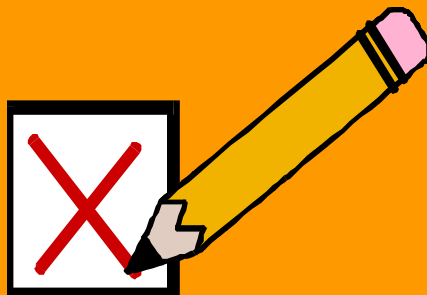
Verification / Test Phase



- Reviews are verification too
 - Most DERs do not attend reviews
- Reviews should be concurrent with the development - not after the fact
- Verify independence as needed
- Assure anomalous behavior is addressed
- Couple the DO-178B details to DO-178B objectives
- Discuss the test environment and analysis
 - Structural coverage
 - Test Results
- Check configuration control

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Final Review



- Most of the DERs interviewed perform a final review on:
 - Life Cycle Data
 - Open Problem Reports or Action Items
 - Quality records
 - Software Configuration Index
 - Software Accomplishment Summary
 - Release process

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What Helps Facilitate the Approval Process

- Early involvement
- No surprises



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Discussion



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